Title (en)

Method of controlling a device for laser welding

Title (de)

Verfahren zur Steuerung einer Vorrichtung zum Schweißen mittels eines Lasers

Title (fr)

Procédé de contrôle d'un dispositif de soudure par laser

Publication

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Application

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Priority

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Abstract (en)

The method for controlling a device for welding using a laser beam emitted by a laser (1), where the device has a scanner optical unit (2) moved relative to a workpiece (5) to be processed by a guiding machine and operating according to the principle of the pre-objective scanning and post-objective scanning, a projector (7) moved with the scanner optical unit and an image sensor moved with the scanner optical unit, comprises arranging the projector outside of a beam path of the scanner optical unit, and tilting an optical axis of the projector opposite to the optical axis of the laser. The method for controlling a device for welding using a laser beam emitted by a laser (1), where the device has a scanner optical unit (2) moved relative to a workpiece (5) to be processed by a guiding machine and operating according to the principle of the pre-objective scanning and post-objective scanning, a projector (7) moved with the scanner optical unit and an image sensor moved with the scanner optical unit, comprises arranging the projector outside of a beam path of the scanner optical unit, tilting an optical axis of the projector opposite to the optical axis of the laser, where the beam path of the scanner optical unit is guided using active and/or passive deflection units, the projector serves to project the measuring light to the workpiece to be processed in the form of measuring structures, the image sensor is sensitive in the wavelength region of the measuring light radiated from the projector and the measuring light radiated from the projector consists of a line, which runs transverse to a longitudinal direction of a welding seam to be produced onto the workpiece to be processed, and changing a default value of a progression of the measuring light in a welding seam direction with respect to an impact position of the laser beam during the production of the welding seam. A tilting angle is changed for changing the default value of the progression. The default value of the progression is changed by using the scanner optical unit. The real working progression constantly holds with height variations between the scanner optical unit and the component along the welding seam to be produced. Signals from the measuring light are incorporated with the image sensor during the production of the welding seam. The topology of the workpiece to be processed is emitted from the image signals in the vicinity of the welding seam to be produced using a triangulation process. The default value for the working progression is adapted using the topology data, so that the deviations of the real working progression from the targeted value of the working progression caused by height variations are compensated in the progression of the welding seam. A light-section process is used as triangulation process. The default value of the progression is cyclically varied towards the larger default values using the projector beginning with the default value of the working progression and the image signals are incorporated during each variation from the image sensor. The variation of the default value of the progression takes place inside the image region of the image sensor. The larger default value of the progression is possible as default value lying in the image region of the image sensor during the variation of the default value of the progression of the image region of the image sensor is guided post to the measuring light using the scanner optical unit. The method further comprises recording a number of individual images per time unit with the image sensor, where the number of the individual image is doubly large as the number which is required for seam tracking, determining the signal to noise ratio of each individual image, adjusting the individual image in good image when the signal-to-noise of a fixed value exceeds and the fixed value is dropped down in bad image, determining an error quotients from the bad picture and the good picture, increasing the default value of the progression when the error quotient of the individual image of a determined value is exceeded and the reduction of the default value of the progression falls below the error quotient of a determined value. A working speed of the laser beam is increased temporarily, where a movement of the laser beam is added by the scanner optical unit for the movement of the laser beam by the guiding machine.

Abstract (de)

Die Erfindung betrifft ein Verfahren, mit dem die Genauigkeit der Führung des Bearbeitungslasers von Fügevorrichtungen, die mittels einer Scanner-Optik (2) gesteuert werden, insbesondere bei Nähten, in deren Verlauf große Änderungen der Höhe relativ zur Scanner-Optik (2) auftreten, nachhaltig verbessert wird. Hierzu wird während der Erzeugung der Schweißnaht der Vorgabewert des Vorlaufs des Messlichts (8) in Nahtlängsrichtung bezüglich der Auftreffposition des Laserstrahls (4) verändert. Während des Schweißens werden Bildsignale aufgenommen, durch die mit einem Triangulationsverfahren die Topologie des Werkstücks (5) in der Umgebung der zu erzeugenden Naht ermittelt und mit den Topologiedaten die Abweichung (14) des realen Arbeitsvorlaufs (13a) vom Sollwert des Arbeitsvorlaufs (13b) kompensiert wird, und/oder der Vorgabewertwert des Arbeitsvorlaufs (13a) wird mit Hilfe des Signal-/Rauschverhältnisses geregelt.

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